

LISTING OF CLAIMS

Please replace all previous versions, and listings, of claims in the present application with the following listing of claims.

1. (Currently amended) A semiconductor device electrically and mechanically connectable to an external circuit, comprising:

a semiconductor substrate including a fixed portion, a movable portion, and connecting members ~~for elastically connecting said movable portion to said fixed portion~~, on a plane, said semiconductor substrate having ~~grooves~~ gaps between said fixed portion and said movable portion, said connecting members elastically connecting said movable portion to said fixed portion across said gaps, ~~except said connecting members~~, said movable portion being movable in a predetermined direction with respect to said fixed portion, said fixed portion ~~having electrical insulation being~~ electrically insulated from said movable portion and ~~including~~ comprising:

an input electrode for inputting a periodical signal from said ~~an~~ external circuit ~~substrate to said~~ movable portion to vibrate said movable portion; ~~and~~

an output electrode for outputting a signal indicative of capacitive variation based on vibration of said movable portion in said predetermined direction with respect to said output electrode; and

a shield substrate arranged at peripheries of said movable portion, said input electrode, and said output electrode;

an input wire for connecting said input electrode to said external circuit ~~substrate to supply~~ said periodical signal to said input electrode;

an output wire ~~for connecting~~ connected to said output electrode and being connectable to said external circuit ~~substrate~~;

a shield wire ~~connected~~ connectable to a constant potential at said external circuit ~~substrate~~ to provide capacitive shielding between said input wire and said output wire; and

a pad connected to said shield wire on said shield substrate ~~fixed portion~~ at a location ~~other than said input electrode and said output electrode~~ between said input electrode and said output electrode to place said shield wire between said input wire and output wire having electrical insulation to shield said output wire from said periodical signal on said input wire with a predetermined positional relation therebetween when said semiconductor device is electrically and mechanically connected to said external circuit, and to supply said constant potential to said ~~fixed portion~~ shield substrate to shield said output electrode from said periodical signal on said input electrode when said semiconductor device is electrically and mechanically connected to said external circuit,

wherein said shield frame, said input electrode, and said output electrode are coplanar.

2. (Original) The semiconductor device as claimed in claim 1, wherein a top surface of said semiconductor substrate has a rectangular shape, and said input electrode and said output electrode are arranged at locations corresponding to different sides of said rectangular shape, respectively.

3. (Original) The semiconductor device as claimed in claim 1, wherein said shield wire is grounded at said circuit substrate.

4. (Previously Presented) The semiconductor device as claimed in claim 1, wherein said shield wire is arranged adjacent to either of said input electrode or said output electrode.

5.(Currently Amended) The semiconductor device as claimed in claim 1, wherein said fixed portion further includes a dummy electrode adjacent to said output electrode and capacitively coupled to said input electrode for generating a dummy signal, and

a dummy signal wire is connected to said dummy electrode and said circuit substrate, said dummy signal including an induced component of said periodical signal and being supplied to said circuit substrate to be used to cancel another component of said periodical signal induced in said periodical signal.

6. (Previously Presented) The semiconductor device as claimed in claim 1, wherein said movable portion is movable in another predetermined direction with respect to said fixed portion, said semiconductor device further comprising angular velocity detection means for detecting vibration of said movable portion in said another direction to determine an angular velocity around an axis perpendicular to said predetermined direction and another predetermined direction to generate said detection signal.

7. (Currently amended) A semiconductor device electrically and mechanically connectable to an external circuit, comprising:

a semiconductor substrate including a fixed portion, a movable portion, and connecting members ~~for elastically connecting said movable portion to said fixed portion~~, on a plane, said semiconductor substrate having ~~grooves~~ gaps between said fixed portion and said movable portion, said connecting members elastically connecting said movable portion to said fixed portion across said gaps, ~~except at said connecting members~~, said movable portion being movable in a predetermined direction with respect to said fixed portion, said fixed portion ~~having electrical insulation being~~ electrically insulated from said movable portion and ~~including~~ comprising:

an input electrode for inputting a periodical signal from said ~~an~~ external circuit ~~substrate~~ to said movable portion to vibrate said movable portion;

an output electrode for outputting a signal indicative of capacitive variation based on vibration of said movable portion in said predetermined direction with respect to said output electrode;
and

a monitor electrode for monitoring capacitive variation based on vibration of said movable portion in said first predetermined direction with respect to said monitor electrode and supplying a monitor signal to said external circuit ~~substrate~~; and

a shield substrate arranged at peripheries of said movable portion, said input electrode, said output electrode, and said monitor electrode;

an input wire ~~for connecting~~ connected to said input electrode and being connectable to said external circuit ~~substrate~~ to supply said periodical signal to said input electrode;

an output wire ~~for connecting~~ connected to said output electrode and being connectable to said external circuit ~~substrate~~;

a monitor wire ~~for connecting~~ connected to said monitor electrode and being connectable to said external circuit ~~substrate~~;

a shield wire ~~connected~~ connectable to a constant potential at said external circuit ~~substrate~~ to provide capacitive shielding between said input wire and said output wire and between said input wire and said monitor wire; and

a pad connected to said shield wire on said fixed portion at a location ~~other than said input electrode and said output electrode~~ between said input electrode and said output electrode to place said shield wire between said input wire and output wire and between said input wire and said monitor wire having electrical insulation to shield said output wire and said monitor wire from said periodical signal on said input wire with a predetermined positional relation therebetween when said

semiconductor device is electrically and mechanically connected to said external circuit and to supply said constant potential to ~~said fixed portion~~ shield substrate to shield said output electrode and said monitor electrode from said periodical signal on said input electrode when said semiconductor device is electrically and mechanically connected to said external circuit,

wherein said shield frame, said input electrode, and said output electrode are coplanar.

8. (Original) The semiconductor device as claimed in claim 7, wherein said semiconductor plate is a rectangular plate, and said input electrode and said output electrode are arranged at locations corresponding to different sides of said rectangular plate, respectively.

9. (Original) The semiconductor device as claimed in claim 7, wherein said shield wire is grounded at said circuit substrate.

10. (Previously Presented) The semiconductor device as claimed in claim 7, wherein said shield wire is arranged adjacent to either of said input wire or said output wire.

11. (Previously Presented) The semiconductor device as claimed in claim 7, wherein said shield wire is arranged adjacent to either of said input wire or said monitor wire.

12. (Previously Presented) The semiconductor device as claimed in claim 7, wherein said fixed portion further includes a dummy electrode adjacent to said output electrode and capacitively coupled to said input electrode for generating a dummy signal, and

a dummy signal wire is connected to said dummy electrode and said circuit substrate, said dummy signal including an induced component of said periodical signal and being supplied

to said circuit substrate to be used to cancel another component of said periodical signal induced in said periodical signal.

13. (Currently amended) A semiconductor device electrically and mechanically connectable to an external circuit, comprising:

a semiconductor substrate including, on a plane, a fixed portion and a movable portion, said fixed portion ~~having~~ comprising a shield substrate, and elastically supporting means connected to a supporting substrate for supporting said movable portion to allow ~~movement~~ said movable portion to move in a predetermined direction with respect to said fixed portion, said movable portion being electrically connected to a predetermined potential;

capacitive driving means for driving said movable portion, said capacitive driving means including a drive electrode included in said fixed portion for ~~inputting~~ receiving a drive signal from ~~an~~ said external circuit substrate to provide a drive force to said movable portion to vibrate said movable portion;

detection means for detecting capacitive variation based on vibration of said movable portion caused by supplying said drive signal to said drive electrode ~~movable portion~~, said detection means including a detection electrode included in said fixed portion to supply a detection signal indicative of said capacitive variation to said external circuit ~~substrate~~;

a shield wire pad arranged between said drive electrode and said detection electrode neighboring said drive electrode;

a drive signal wire ~~for connecting~~ connected to said drive electrode and being connectable to said external circuit ~~substrate to supply said drive signal to said drive electrode~~;

a detection wire ~~for connecting~~ connected to said detection electrode and being connectable to said external circuit ~~substrate~~; and

a shield wire connected to said shield wire pad and connectable to a constant potential at said external circuit substrate, wherein said shield wire provides to provide capacitive shielding between said drive signal wire and said detection wire to shield said detection wire from said drive signal on said drive signal wire when said semiconductor device is electrically and mechanically connected to said external circuit with a predetermined positional relation therebetween and to supply said constant potential to said ~~fixed portion~~ shield substrate to further shield said detection electrode and said detection wire from said drive signal on said drive signal wire when said semiconductor device is electrically and mechanically connected to said external circuit,

wherein said shield substrate, said drive electrode, and said detection electrode are coplanar.

14. (Previously Presented) The semiconductor device as claimed in claim 1, wherein said pad is arranged on said fixed portion to have predetermined distances to said input electrode and said output electrode to provide spatial distances for said capacitive shielding between said input wire and said output wire by said shield wire connected to said pad.

15. (Previously Presented) The semiconductor device as claimed in claim 7, wherein said pad is arranged on said fixed portion to have predetermined distances to said input electrode and said output electrode to provide spatial distances for said capacitive shielding between said input wire and said output wire by said shield wire connected to said pad.

16. (Currently Amended) The semiconductor device as claimed in claim 13, wherein said shield wire pad is arranged on said fixed portion to have predetermined distances to said drive electrode and said detection electrode to provide spatial distances for said capacitive shielding

between said drive signal wire and said detection wire by said shield wire connected to said shield wire pad.

17. (Currently amended) A semiconductor device electrically and mechanically connectable to an external circuit, comprising:

a semiconductor substrate including a fixed portion, a movable portion, and connecting members ~~for elastically connecting said movable portion to said fixed portion~~, said semiconductor substrate ~~having grooves~~ including gaps between said fixed portion and said movable portion, said connecting members elastically connecting said movable portion to said fixed portion across said gaps, ~~except said connecting members~~, said fixed portion being coplanar with said movable portion across said ~~grooves~~ gaps and said connecting members throughout said ~~grooves~~ gaps and said connecting members, said movable portion being movable in predetermined first and second directions with respect to said fixed portion, said fixed portion having electrical insulation from said movable portion and including:

an input electrode for inputting a periodical signal from ~~an~~ said external circuit ~~substrate~~ to said movable portion to vibrate said movable portion; ~~and~~

an output electrode for outputting a signal indicative of capacitive variation based on vibration of said movable portion in said predetermined direction toward said external circuit substrate; and

an input wire ~~for connecting~~ connected to said input electrode and being connectable to said external circuit ~~substrate~~ to supply said periodical signal to said input electrode;

an output wire ~~for connecting~~ connected to said output electrode and being connectable to said external circuit ~~substrate~~;

a shield wire ~~connected~~ connectable to a constant potential at said external circuit ~~substrate~~ to provide capacitive shielding between said input wire and said output wire; and

a pad connected to said shield wire on said fixed portion at a location ~~other than said input electrode and said output electrode~~ between said input electrode and said output electrode to place said shield wire between said input wire and output wire having electrical insulation to shield said output wire from said periodical signal on said input wire when said semiconductor device is electrically and mechanically connected to said external circuit with a predetermined positional relation therebetween and to supply said constant potential to said ~~fixed portion~~ shield substrate to shield said output electrode from said periodical signal on said input electrode when said semiconductor device is electrically and mechanically connected to said external circuit.

wherein said shield substrate, said input electrode, and said output electrode are coplanar.

18. (Currently amended) The semiconductor device as claimed in claim 17, wherein said connecting members includes driving beams allowing said movable portion to move in said first predetermined direction and detection beams allowing said movable portion to move in said second predetermined direction, and said driving beams and said detection beams are independently arranged.

19. (Currently amended) The semiconductor device as claimed in claim 18, wherein said driving beams and said detection beams have different shapes, said driving beams each ~~have a bar shape~~ having a U-shape and said detection beams each ~~have a U~~ having a straight bar shape.

20. (Currently amended) A semiconductor device electrically and mechanically connectable to an external circuit, comprising:

a semiconductor substrate including, on a plane, a fixed portion and a movable portion, said fixed portion ~~being fixed with respect to an external circuit substrate and having~~ comprising a shield substrate and supporting means connected to said shield substrate for supporting said movable portion with movement in a predetermined direction with respect to said fixed portion, said movable portion being electrically connected to a predetermined potential;

capacitive driving means for driving said movable portion, said capacitive driving means including a drive electrode included in said fixed portion for ~~inputting~~ receiving a drive signal from said external circuit ~~substrate~~ to provide a drive force to said movable portion to vibrate said movable portion;

detection means including a detection electrode for detecting capacitive variation with respect to said detection electrode based on vibration of said movable portion caused by supplying said drive signal to said drive electrode ~~movable portion~~, said detection means including a detection electrode included in said fixed portion to ~~supply output~~ provide a detection signal indicative of said capacitive variation ~~to said external circuit substrate~~;

a shield wire pad arranged between said drive electrode and said detection electrode that is adjacent to said drive electrode;

a drive signal wire ~~for connecting~~ connected to said drive electrode and being connectable to said external circuit ~~substrate~~ to supply said drive signal to said drive signal electrode;

a detection wire ~~for connecting~~ connected to said detection electrode and being connectable to said external circuit ~~substrate~~, said shield substrate being arranged at peripheries of said moving portion, said drive electrode, and said detection electrode; and

a shield wire connected to said shield wire pad and being connectable to a constant potential at said external circuit ~~substrate~~ wherein said shield wire provides ~~to provide~~ capacitive shielding between said drive signal wire and said detection wire to shield said detection wire from said drive

signal on said drive signal wire when said semiconductor device is electrically and mechanically connected to said external circuit with a predetermined positional relation therebetween and to supply said constant potential to said ~~fixed portion~~ shield substrate to shield said detection electrode from said drive signal on said drive signal electrode,

wherein said shield substrate, said drive electrode, and said detection electrode are coplanar.

21. (Currently amended) The semiconductor device as claimed in claim 20, wherein said connecting members includes driving beams allowing said movable portion to move in said first predetermined direction and detection beams allowing said movable portion to move in said second predetermined direction, and said driving beams and said detection beams are independently arranged.

22. (Currently amended) The semiconductor device as claimed in claim 20, wherein said driving beams and said detection beams have different shapes, said driving beams each ~~have a bar shape~~ having a U-shape and said detection beams each ~~have a U~~ having a straight bar shape.

23. (Currently amended) A semiconductor device electrically and mechanically connectable to an external circuit, comprising:

a semiconductor substrate including, on a plane, a fixed portion and a movable portion, said fixed portion ~~being fixed with respect to an external circuit substrate and having~~ comprising a shield substrate and elastically supporting means connected to said shield substrate for supporting said movable portion to allow movement in a predetermined direction with respect to said fixed portion, said movable portion being electrically ~~connected~~ connectable to a predetermined potential;

capacitive driving means for driving said movable portion, said capacitive driving means including a drive electrode included in said fixed portion for ~~inputting~~ receiving a drive signal from

said external circuit ~~substrate~~ to provide a drive force to said movable portion to vibrate said movable portion;

detection means for detecting capacitive variation based on vibration of said movable portion caused by supplying said drive signal to said drive electrode ~~movable portion~~, said detection means including a detection electrode included in said fixed portion to supply output a detection signal to ~~said external circuit substrate~~;

a shield wire pad arranged between said drive electrode and said detection electrode neighboring said drive electrode;

a drive signal wire ~~for connecting~~ connected to said drive electrode and being connectable to said external circuit ~~substrate~~ to supply said drive signal to said drive signal electrode;

a detection wire ~~for connecting~~ connected to said detection electrode and being connectable to said external circuit ~~substrate~~, said shield substrate being arranged at peripheries of said moving portion, said drive electrode, and said detection electrode; and

a shield wire connected to said shield wire pad and being connectable to a constant potential at said external circuit ~~substrate~~, wherein said shield wire provides ~~to provide~~ capacitive shielding between said drive signal wire and said detection wire to shield said detection wire from said drive signal on said drive signal wire with a predetermined positional relation therebetween when said semiconductor device is electrically and mechanically connected to said external circuit and to supply said constant potential to said ~~fixed portion~~ shield substrate to shield said detection electrode from said drive signal on said drive signal electrode,

wherein said shield substrate, said drive electrode, and said detection electrode are coplanar.

24. (Currently amended) The semiconductor device as claimed in claim 23, wherein said ~~connecting members~~ supporting means includes driving beams allowing said movable portion to

move in said ~~first~~ predetermined direction and detection beams allowing said movable portion to move in another predetermined direction, and said driving beams and said detection beams are independently arranged.

25. (Currently amended) The semiconductor device as claimed in claim 23, wherein said driving beams and said detection beams have different shapes, said driving beams each ~~have a bar~~ shape having a U-shape and said detection beams each ~~have a U~~ having a straight bar shape.

26. (New) The semiconductor device as claimed in claim 1, wherein said movable portion comprises an electrode facing said output electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

27. (New) The semiconductor device as claimed in claim 7, wherein said movable portion comprises an electrode facing said output electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

28. (New) The semiconductor device as claimed in claim 13, wherein said movable portion comprises an electrode having said predetermined potential supplied from said movable portion and facing said detection electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

29. (New) The semiconductor device as claimed in claim 17, wherein said movable portion is electrically connected to a predetermined potential and comprises an electrode having said predetermined potential supplied from said movable portion and facing said output electrode to

provide a capacitance providing said capacitive variation when said movable portion vibrates in said first predetermined direction.

30. (New) The semiconductor device as claimed in claim 20, wherein said movable portion comprises an electrode having said predetermined potential supplied from said movable portion and facing said detection electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

31. (New) The semiconductor device as claimed in claim 23, wherein said movable portion comprises an electrode having said predetermined potential supplied from said movable portion and facing said detection electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

32.(New) A semiconductor device comprising:

a circuit substrate and a semiconductor substrate fixed with respect to said circuit substrate, said semiconductor substrate including a fixed portion, a movable portion, and connecting members, on a plane, said semiconductor substrate having gaps between said fixed portion and said movable portion, said connecting members elastically connecting said movable portion to said fixed portion across said gaps, said movable portion being movable in a predetermined direction with respect to said fixed portion, said fixed portion including electrical insulation from said movable portion and comprising:

an input electrode for inputting a periodical signal from said circuit substrate to said movable portion to vibrate said movable portion;

an output electrode for outputting a signal indicative of capacitive variation based on vibration of said movable portion in said predetermined direction with respect to said output electrode; and

a shield substrate arranged at peripheries of said movable portion, said input electrode, and said output electrode with electrical insulation;

an input wire for connecting said input electrode to said circuit substrate to supply said periodical signal to said input electrode;

an output wire for connecting said output electrode to said circuit substrate;

a shield wire connected to a constant potential at said circuit substrate to provide capacitive shielding between said input wire and said output wire; and

a shield pad connected to said shield wire on said fixed portion at a location between said input electrode and said output electrode to place said shield wire between said input wire and output wire having electrical insulation to shield said output wire from said periodical signal on said input wire and to supply said constant potential to said shield substrate to shield said output electrode and said output wire from said periodical signal on said input electrode,

wherein said shield substrate, said input electrode, and said output electrode are coplanar.

33. (New) The semiconductor device as claimed in claim 32, wherein said movable portion is electrically connected to a predetermined potential and comprises an electrode facing said output electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

34. (New) The semiconductor device as claimed in claim 32, said shield substrate comprises a frame surrounding at least said output electrode and input electrode and arranged at least between said detection electrode and said drive electrode.

35.(New) A semiconductor device comprising:

a circuit substrate and a semiconductor substrate fixed with respect to said circuit substrate, said semiconductor substrate including a fixed portion, a movable portion, and connecting members, on a plane, said semiconductor substrate having gaps between said fixed portion and said movable portion, said connecting members elastically connecting said movable portion to said fixed portion across said gaps, said movable portion being movable in a predetermined direction with respect to said fixed portion, said fixed portion being electrically insulated from said movable portion and comprising:

an input electrode for inputting a periodical signal from said circuit substrate to said movable portion to vibrate said movable portion;

an output electrode for outputting a signal indicative of first capacitive variation based on vibration of said movable portion in said predetermined direction with respect to said output electrode;

a monitor electrode for monitoring second capacitive variation based on vibration of said movable portion in said first predetermined direction and supplying a monitor signal to said circuit substrate;

and

a shield substrate arranged at peripheries of said movable portion, said input electrode, and said output electrode;

an input wire for connecting said input electrode to said circuit substrate to supply said periodical signal to said input electrode;

an output wire for connecting said output electrode to said circuit substrate;

a monitor wire for connecting said monitor electrode to said circuit substrate;

a shield wire connected to a constant potential at said circuit substrate to provide capacitive shielding between said input wire and said output wire and between said input wire and said monitor wire; and

a shield pad connected to said shield wire on said fixed portion at a location between said input electrode and said output electrode to place said shield wire between said input wire and output wire to shield said output wire from said periodical signal on said input wire and between said input wire and said monitor wire having electrical insulation to shield said monitor wire from said periodical signal on said input wire and to supply said constant potential to said shield substrate to shield said monitor electrode and said output electrode from said periodical signal on said input electrode,

wherein said shield substrate, said input electrode, and said output electrode are coplanar.

36. (New) The semiconductor device as claimed in claim 35, wherein said movable portion is electrically connected to a predetermined potential and comprises a first electrode facing said output electrode to provide a first capacitance providing said first capacitive variation when said movable portion vibrates in said predetermined direction and a second electrode facing said monitor electrode to provide a second capacitance providing said second capacitance variation when said movable portion vibrates in said predetermined direction.

37. (New) The semiconductor device as claimed in claim 35, said shield substrate comprises a frame surrounding said detection electrode and said drive electrode and arranged, at least, between said monitor electrode and said input electrode and between said output electrode and said input electrode.

38. (New) A semiconductor device comprising:

a circuit substrate and a semiconductor substrate fixed with respect to said circuit substrate, said semiconductor substrate including, on a plane, a fixed portion and a movable portion, said fixed portion comprising a shield substrate and elastically supporting means connected to said shield substrate for supporting said movable portion to allow movement in a predetermined direction with respect to said fixed portion, said movable portion being electrically connected to a predetermined potential;

capacitive driving means for driving said movable portion, said capacitive driving means including a drive electrode supported by said shield substrate for receiving a drive signal from said circuit substrate to provide a drive force to said movable portion to vibrate said movable portion;

detection means for detecting capacitive variation based on vibration of said movable portion caused by supplying said drive signal to said drive electrode, said detection means including a detection electrode to supply a detection signal indicative of said capacitive variation to said circuit substrate, said shield substrate being arranged at peripheries of said detection electrode and said drive electrode;

a shield wire pad arranged between said drive electrode and said detection electrode which is adjacent to said drive electrode;

a drive signal wire for connecting said drive electrode to said circuit substrate to supply said drive signal to said drive signal electrode;

a detection wire for connecting said detection electrode to said circuit substrate; and

a shield wire connected to said shield wire pad and a constant potential at said circuit substrate, wherein said shield wire provides capacitive shielding between said drive signal wire and said detection wire to shield said detection wire from said drive signal on said drive signal wire and to

supply said constant potential to said shield substrate to shield said detection electrode from said drive signal on said drive electrode,

wherein said shield substrate, said drive electrode, and said detection electrode are coplanar.

39. (New) The semiconductor device as claimed in claim 38, wherein said movable portion is electrically connected to a predetermined potential and comprises an electrode facing said detection electrode to provide a capacitance providing said capacitive variation when said movable portion vibrates in said predetermined direction.

40. (New) The semiconductor device as claimed in claim 38, wherein said shield substrate comprises a shield frame surrounding at least said detection electrode and said drive electrode and arranged at least between said detection electrode and said drive electrode.